



Australian Bureau of Statistics

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Summary

Main Features

AUSTRALIAN POPULATION GRID 2011

Please Note: This publication can be viewed in three formats:

- **ESRI Grid** format -for use in Geographic Information Systems (GIS) only.
- **GeoTIFF** format - for use in a Geographic Information System (GIS) and in some graphics software.
- **PNG** format - for use in any graphics software including those bundled with major operating systems (Microsoft Windows, Apple OS X & iOS).

This release presents the first time population data has been published in 1km² grid format by the Australian Bureau of Statistics. The grid displays Usual Resident Population (URP) from the 2011 Census of Population and Housing using 1km² grid cells across Australia. The 1km² resolution of the grid therefore offers a measure of population density for Australia. The data has been modelled from perturbed Mesh Block level URP values.

The grid offers a consistently sized spatial unit and gives a refined model of population distribution, particularly for the non-urban areas of Australia. Another spatial unit, known as Mesh Block, was previously the most detailed geographic unit available. Figure 1 is a population density map using Mesh Blocks. Figure 2 is a population density map using the the 1 km² grid.

Figure 1. Mesh Block Population Density August 2011

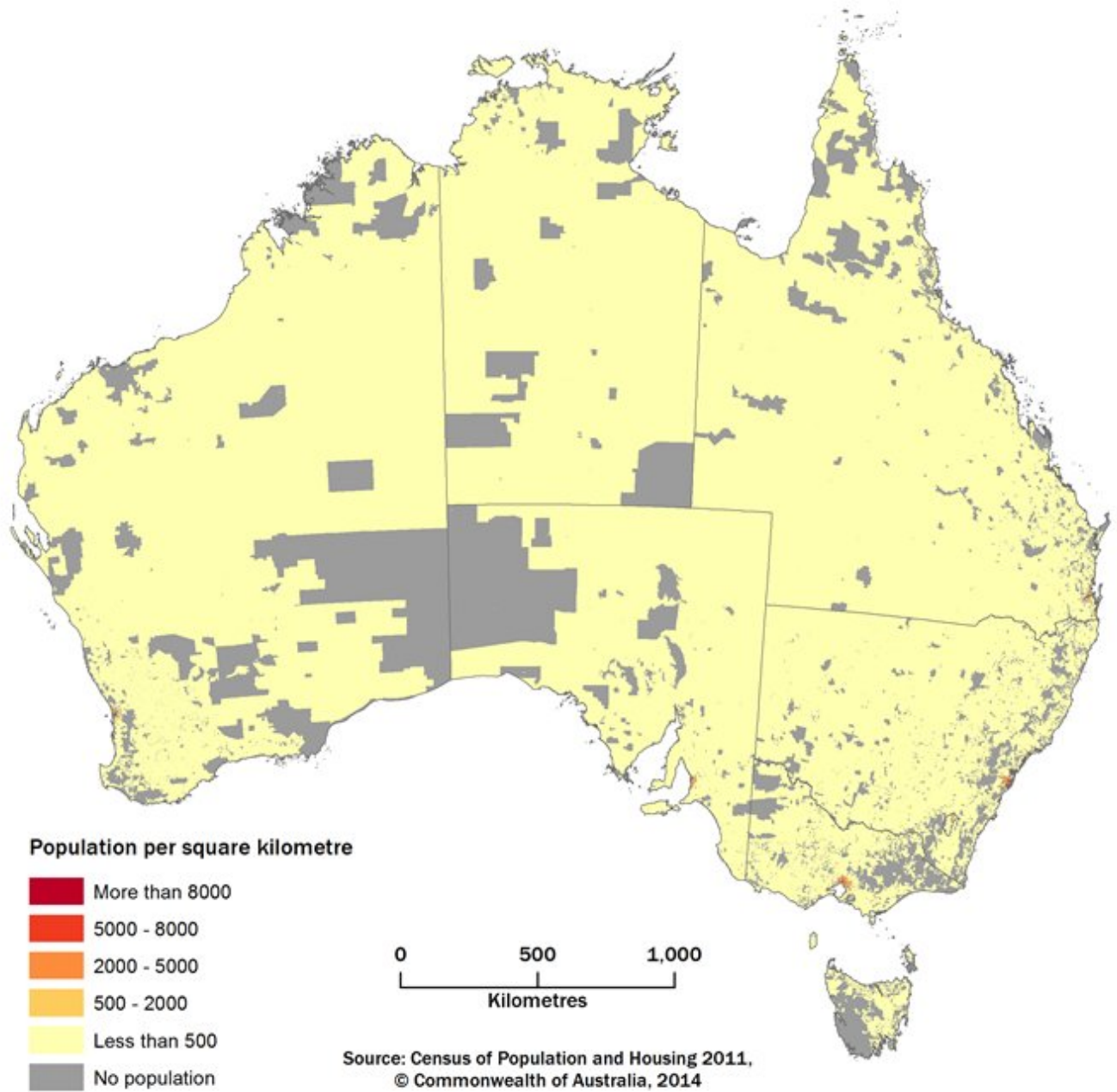
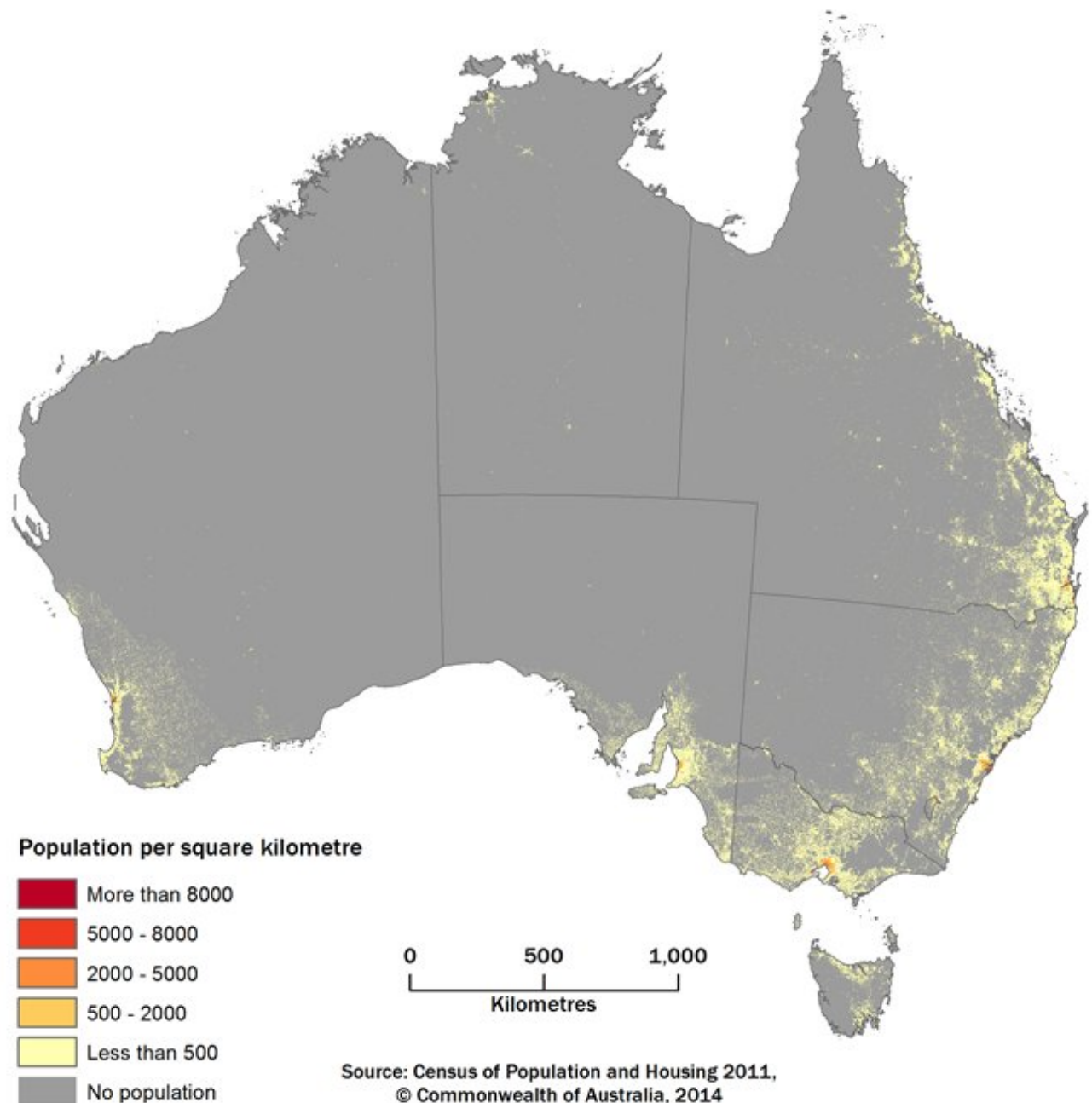


Figure 2. Population Density 1km² Grid August 2011



Australia's most densely populated residential area in 2011 based on the grid was in Sydney around the suburbs of Potts Point and Woolloomooloo. The 1 km² grid cell covering these suburbs had a usual resident population of 14,747 in 2011.

The consistent sized cells of the grid format lend themselves to comparison of regions. Figure 3 compares the population grid for Sydney and Melbourne. It shows that Sydney had more areas in the highest density range shown in the map with 21km² exceeding 8,000 people per square kilometre compared to Melbourne which only had one grid cell exceeding 8,000 people per square kilometre, around the suburb of Carlton. Sydney also had larger and more widely spread areas of the second highest density class with 93km² of between 5,000 and 8,000 people per square kilometre, while Melbourne had 33km² in the same range. Brisbane was the only other capital city to register in these higher density categories with 3km² between 5,000 and 8,000 people per square kilometre.

Figure 3. Population Density 1km² Grid August 2011 - Melbourne and Sydney

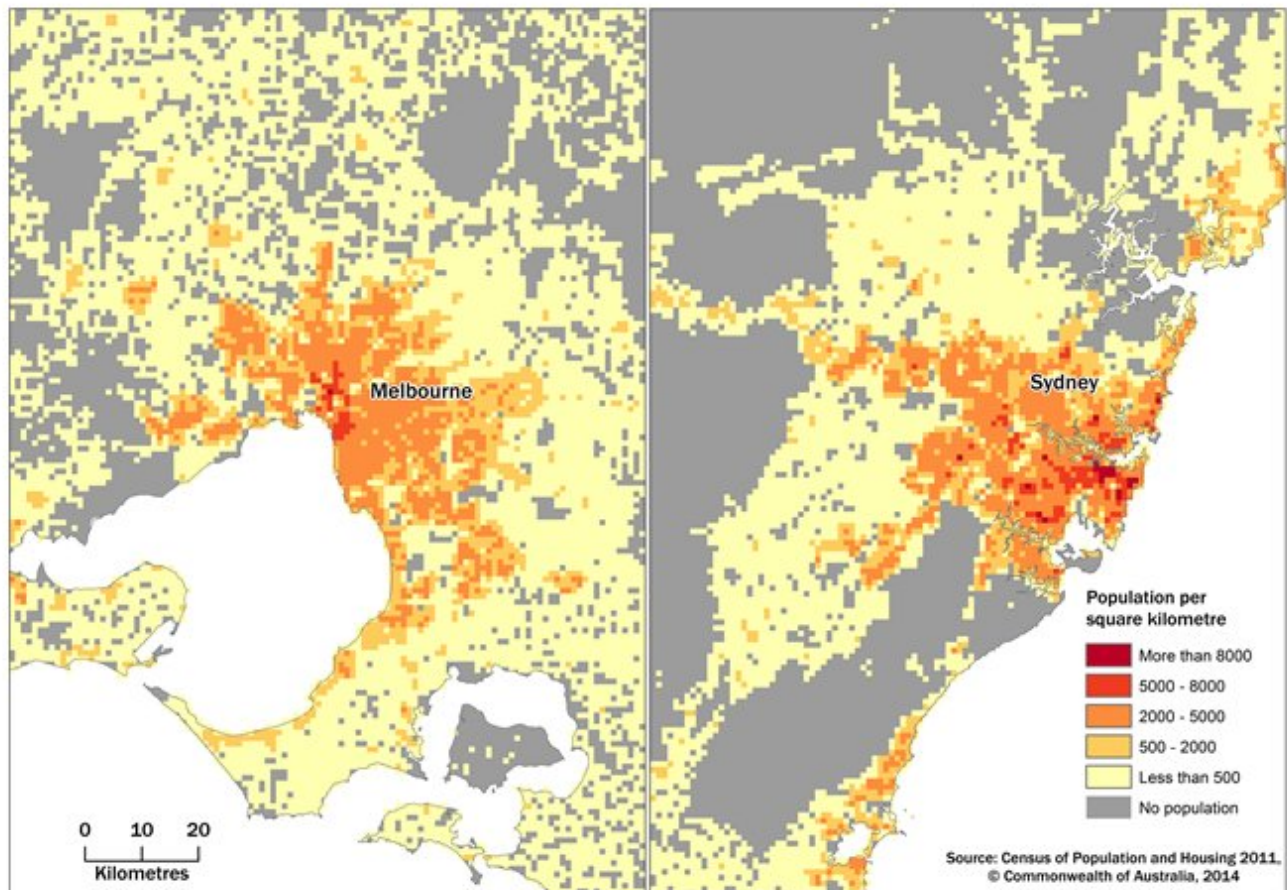


Table 1 shows the area within each Greater Capital City Statistical Area (GCCSA) under 6 population density classes, from no population to very high. These areas are calculated from the Population Grid and the classes are based on the ranges used in Figures 2 and 3. The Brisbane GCCSA had the largest area of very low population density (less than 500 people per square kilometre) at 9,275km² in 2011. This highlights the spread of low density population around Brisbane and also the relatively large extent of the Brisbane GCCSA when compared with other capital cities.

Table 1: Total area in six population density classes in Greater Capital City Statistical Areas (km²).

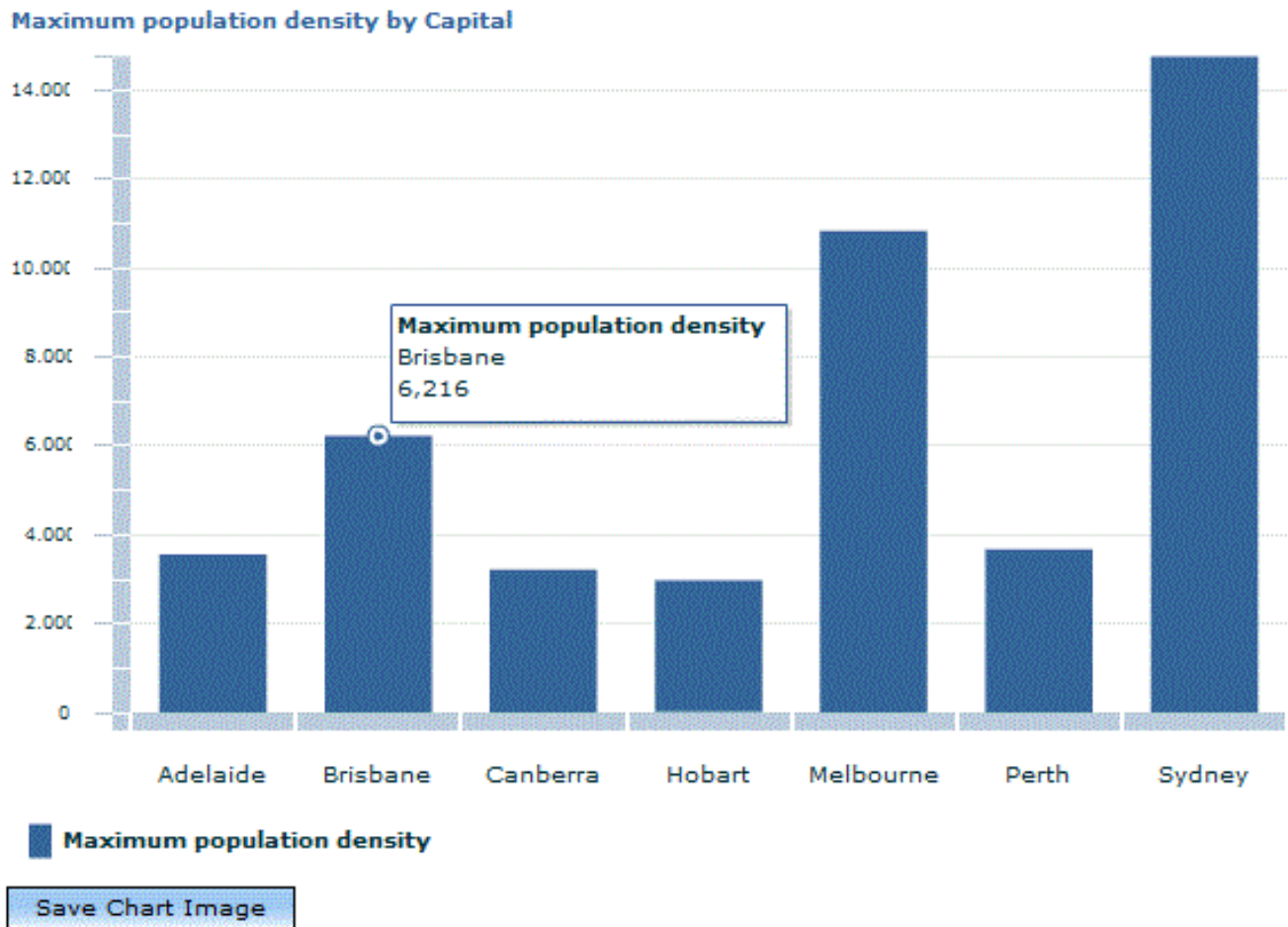
	No population (0)*	Very low (Less than 500)*	Low (500-2000)*	Medium (2000-5000)*	High (5000-8000)*	Very High (More than 8000)*
Sydney	6562	4013	890	785	93	21
Melbourne	2742	5376	1013	837	33	1
Brisbane	5459	9275	777	324	3	0
Adelaide	232	2345	441	233	0	0
Perth	2500	2913	711	292	0	0
Hobart	456	1108	120	11	0	0
Darwin	2203	908	48	14	0	0
Canberra	1845	276	206	33	0	0

* people per square kilometre

These population density classes have been used for analysis purposes only and are not an ABS standard classification

Figure 4 presents the maximum population density found in each of the Australian capital cities in 2011. Sydney and Melbourne clearly had the highest densities, both exceeding 10,000 people per square kilometre in the most densely populated areas. Brisbane had the next highest density at 6,216 people per square kilometre. Perth, Adelaide, Canberra and Hobart had comparable maximum population densities around 3,000 people per square kilometre. Darwin had the lowest value with a maximum density of 2,620 people per square kilometre.

Figure 4. Maximum population density for Australian capital cities August 2011

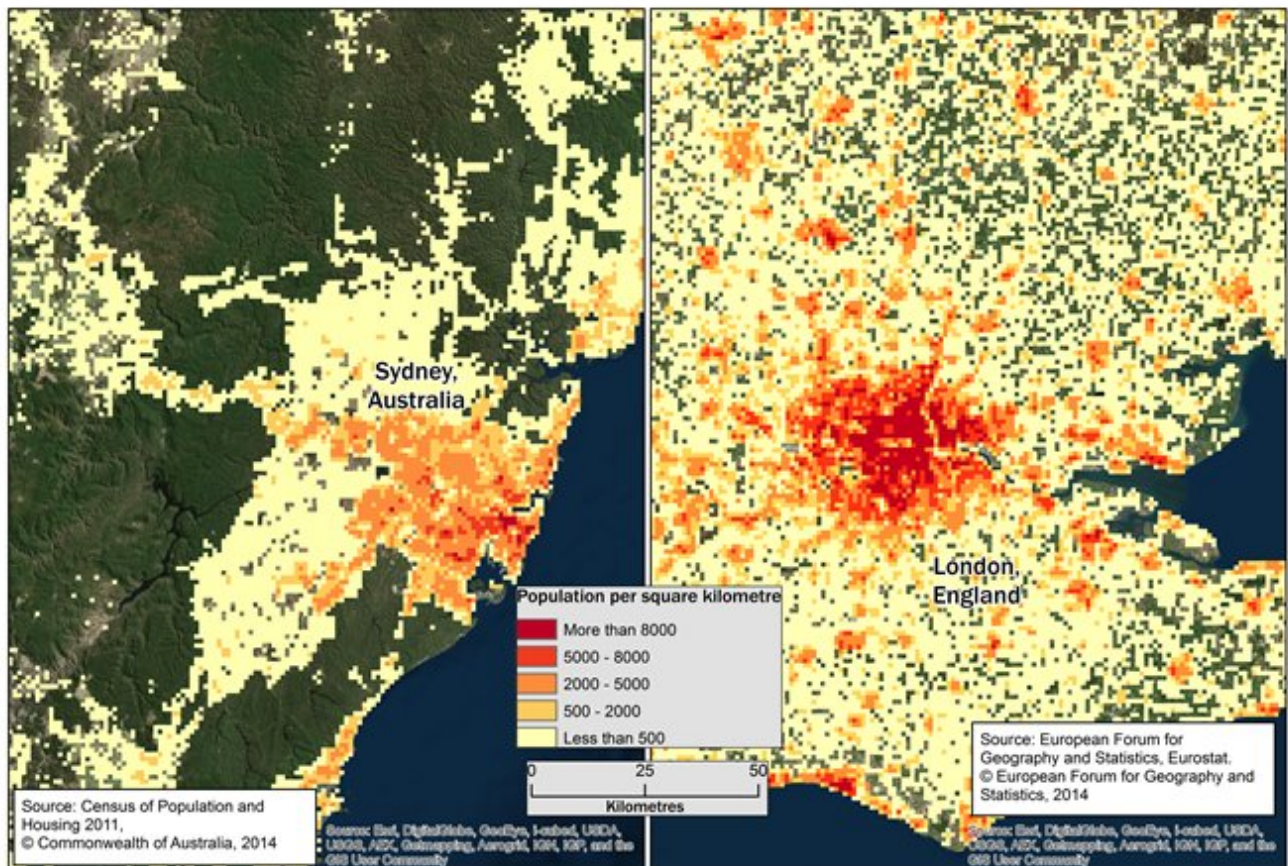


Footnote(s): The 2011 ASGS (GCCSA) were used as capital city boundaries

Source(s): maximum population density by capital-Australian Population Grid 2011

The 1km² resolution of the grid matches a European population grid for 2011 produced by Eurostat, a Directorate-General of the European Commission. This common resolution enables consistent and equal comparisons between regions and cities in Australia and Europe. Figure 5 compares the population grids for Sydney, Australia and London, England. London had significantly higher population density over a much larger area compared to Sydney. London had a maximum population density of 20,477 people per square kilometre in 2011.

Figure 5. Population Density 1km² Grid 2011 - Sydney and London



Some of the advantages the grid format provides are:

- it enables accurate comparison with other countries using grid based measures of population and population density;
- it offers greater spatial accuracy in rural regions where traditional geographies are very large; and
- it enables accurate and efficient integration of population data with other data traditionally produced in grid format such as environmental datasets.

The grid files in GeoTIFF format and ESRI Grid format are for use in a Geographic Information System (GIS) and are located in the 'Downloads' tab of this publication. These GIS files are aligned to the National Nested Grid (NNG) standard for Australia.

The PNG file is also available in the 'Downloads' tab of this publication.

About this Release

This release presents the first population grid produced by the Australian Bureau of Statistics. The grid presents Usual Resident Population (URP) data from the 2011 Census of Population

and Housing using 1km² grid cells across Australia. The 1km² resolution of the grid also offers a measure of population density for Australia. The data has been modelled from Mesh Block level URP values.

History of changes

This document was added or updated on 19/12/2014.

19/12/2014

Graph titled Figure 4. Maximum population density for Australian capitals cities August 2011 on the main features page has been updated to include Darwin data.

Explanatory Notes

Metadata for Australian Population Grid

Please Note: This publication can be viewed in three formats:

- **ESRI Grid** format which can only be opened in a Geographic Information System (GIS).
- **GeoTIFF** format is a Tagged Image File Format (TIFF). It is a raster graphics file format that is widely supported by graphics software. The Geo extension to the TIFF format is a metadata storage format which allows georeferencing information (datums, ellipsoid, coordinate systems, map projection) to be embedded within the TIFF file. These metadata allows Geographical Information Systems (GIS) software, such as MapInfo, ArcGIS or QGIS, to correctly interpret the location of the image and compare the image with other spatial referenced data.
- **PNG** format is a Portable Network Graphics File (PNG). It is a raster graphics file format that is widely supported by graphics software including those bundled with the major operating systems (Microsoft Windows, Apple OS X & iOS). The objective of publishing in PNG format is to allow users to quickly visualise a "picture" of these data.

How the Australian Population grid was created

The population grid was built from published, perturbed Mesh Block values of Usual Resident Population (URP) from the 2011 Census of Population and Housing.

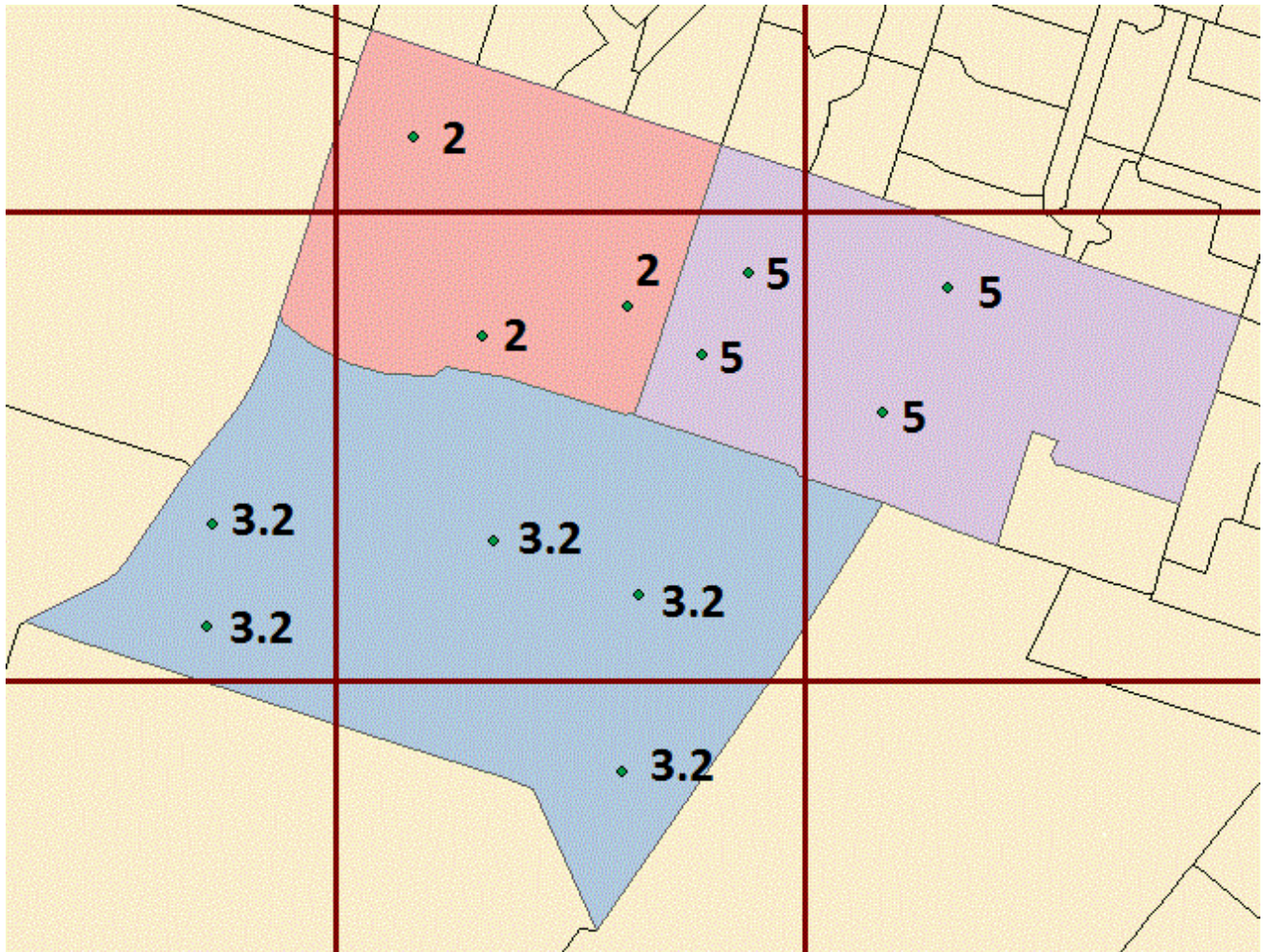
All Mesh Blocks with a URP value greater than zero were identified. Within these Mesh Blocks all residential dwelling locations were identified using a variety of sources including the Geocoded National Address File (GNAF), the Australian Government Indigenous Programs & Policy Locations (AGIL), Locality point locations from the Public Sector Mapping Agency (PSMA) and the Gazetteer 2012 from Geoscience Australia (GA). The vast majority (over 99.9%) of the points used to model the population grid were sourced from GNAF.

The February 2012 edition of GNAF was used to represent August 2011 (Census night) as

there is some lag in the appearance of addresses in GNAF.

Within each populated Mesh Block the 2011 URP was distributed equally across all the residential dwellings. The average value assigned to each dwelling was then summed within each 1km² grid cell across the country. Figure 1 provides a pictorial view of this process. Looking at the three coloured Mesh Blocks that intersect the central grid cell (in red), the blue Mesh Block has a total population of 16 people which was distributed evenly across the 5 points giving each point an average population of 3.2 people. The pink Mesh Block had an average of 5 people per point, and the orange Mesh Block had an average of 2 people per point. The population of the central grid cell is calculated by summing the six points it contains, giving a population of 20.4 (2+2+5+5+3.2+3.2).

Figure 1 : Example of modelling Mesh Block data to grid using GNAF points



A small number of Mesh Blocks have a Usual Resident Population but contain no points in any of the data sets used to produce the population grid. For these Mesh Blocks, synthetic points were generated evenly across the Mesh Block. The number of synthetic points used was equal to the number of dwellings published in the 2011 Census of Population and Housing.

Capital city boundaries

Australian capital city statistics calculated in this publication used the Greater Capital City Statistical Areas (GCCSA) boundaries which are part of the Australian Statistical Geography Standard (ASGS) 2011. The boundary used for London was the Unitary Authority of Greater London for 2011.

List of Data Sources

- Census of Population and Housing: Mesh Block Counts, 2011 (cat. no. 2074.0)
- 2011 Census of Population and Housing (ABS)
- February 2012 edition of the Geocoded National Address File (PSMA)
- Australian Government Indigenous Programs & Policy Locations (AGIL)
- November 2011 edition of Locality centroids (PSMA)
- Gazetteer 2012 (Geoscience Australia)
- Geostat one square kilometre population grid 2011 for Europe (European Forum for Geography and Statistics, and Eurostat).
- Search in Office for National Statistics, open Geography portal for "Local authority district (GB) 2011 Boundaries (Full,Extent)" then use local district codes that start with E09 to make up the Greater London Unitary Authority.

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